

PCT

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		Attorney's Docket Number 70182
		U.S. Application No. (if known sec 17 C.F.R. 1.5) 09/869167
INTERNATIONAL APPLICATION NO. PCT/JP00/07439	INTERNATIONAL FILING DATE 24/October/2000	PRIORITY DATE CLAIMED 25/November/1999
TITLE OF INVENTION SMALL-SIZE MOTOR		
APPLICANT(S) FOR DO/EO/US YAMAZAKI et al.		

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other documents (s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:
Formal Drawings (6 sheets)
Copy of Express Mail Receipt No. EL455156873US
Copies of Cited References (4)
Copy of International Search Report

U.S. Appl. No. 09/869167 (filed on, sec. 37 CFR 1.55)	International Application No. PCT/JP00/07439	Attorney's Docket Number 70182
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17. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO \$860.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) \$690.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$710.00 Neither international preliminary examination fee (37 CFR 1.482 nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$1,000.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$100.00				CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$ 860.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(e))				\$ 0	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	6 - 20 =	0	X \$ 18.00	\$ 0	
Independent claims	1 - 3 =	0	X \$ 80.00	\$ 0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00	\$ 0	
TOTAL OF ABOVE CALCULATIONS =				\$ 0	

Reduction of 1/2 for filing small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28)	\$ 0	
SUBTOTAL =	\$ 860.00	
Processing fee of \$130.00 for furnishing the English translation late than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).	\$ 0	
TOTAL NATIONAL FEE =	\$ 860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +	\$ 40.00	
TOTAL FEES ENCLOSED =	\$ 900.00	
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- a. ☒ A check in the amount of \$ 900.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. 13-0410 in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 13.0410. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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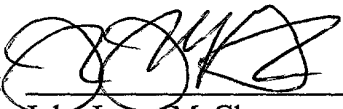
Sir:

Attached please find the complete application papers and Large Entity fees in the above-identified application which are being placed in the U.S. Mail today, June 22, 2001, as Express Mail number EL455156873US.

A copy of the Express Mail receipt is also attached.

Respectfully submitted
for Applicant(s),

By:


John James McGlew
Reg. No. 31,903

JJM:sk

Enclosures - Complete Application Papers and Fees
- Copy of Express Mail Receipt

DATED: June 22, 2001
SCARBOROUGH STATION
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BY: Sheri Gursky DATE: June 22, 2001

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SPECIFICATION

SMALL-SIZE MOTOR

5 TECHNICAL FIELD

The present invention relates to a small-size motor and, more particularly, to a small-size motor capable of being directly fitted with electric elements such as capacitors for driving electrical equipment, household electrical
10 appliances, or the like.

BACKGROUND ART

A small-size motor used for driving electrical equipment, household electrical appliances, or the like is desired to
15 be directly fitted with electric elements such as a capacitor, a diode, and a choke coil, in a motor case cover made of synthetic resin. For example, chip capacitors are attached to reduce electrical noise. However, the case cover of the conventional small-size motor has an insufficient space for installing
20 a required number of electric elements.

Figure 6 is a view of a case cover of a small-size motor having a conventional construction, which is viewed from the inside of the motor (see Japanese Utility Model Application Laid-Open No. 4-121384). Figure 7 is a partially sectional
25 view of the case cover shown in Figure 6, in which the case cover is cut at a capacitor portion. In Figures 6 and 7, a case cover 11 made of synthetic resin is provided with a pair

of input terminals 26 and a pair of brush arms 12. Each of carbon brushes 4 is fixed respectively at a free end of the brush arm 12 connected electrically to the input terminal 26.

5 Each of a pair of capacitors 15 is inserted in a void formed in the case cover 11. An electrode 27 on one side of the capacitor 15 is in contact with the extension 26a of the input terminal 26, and on the other hand, a substantially U-shaped spring member 25 is in contact with an electrode 10 28 on the other side of the capacitor 15. Thus, not only electrical connection can be ensured, but also the capacitors 15 can be fixed firmly in a void in the case cover 11 by being pressed transversely. The spring member 25 also can ensure electrical connection with a metallic case when the case cover 15 11 is fitted to the case.

By the capacitor installation construction as shown in the figures, the need for soldering work and lay-out work for connection wires, which necessarily accompany the connection work for electric elements, can be eliminated. 20 Thus, the electric elements such as capacitors are securely fixed in a limited space, and on the other hand, electrical connection can be provided with high reliability. However, although two electric elements can be installed in the case cover by the construction shown in the figures, three electric 25 elements cannot be installed.

Figure 8 is a view for illustrating the need for installing three electric elements. Figure 8(A) is a schematic

electrical connection diagram for a small-size motor having a conventional construction as shown in Figure 6. In Figure 8, reference character M denotes a motor, and C1 to C3 denote capacitors. A power source is connected to rotor windings of the motor M via brushes from the input terminals, and also is connected respectively to one electrode of each of the two capacitors C1 and C2. The other electrodes of the two capacitors C1 and C2 are connected to each other, and grounded to the metallic case of the motor from the connection point. In the conventional configuration shown in Figure 8(A), since only two capacitors C1 and C2 can be installed, the configuration as shown in the Figure 8(A) is unwillingly adopted, and therefore the electrical noise reducing effect is insufficient on the low-frequency band.

DISCLOSURE OF THE INVENTION

Contrarily, if three capacitors can be installed to provide electrical connection, the wiring can be accomplished as shown in Figure 8(B). Specifically, in addition to the wiring shown in Figure 8(A), a third capacitor C3 can be connected across both input terminals. It has been known that such a circuit is superior in terms of the electrical noise reducing effect on the low-frequency band.

Accordingly, an object of the present invention is to provide a small-size motor in which a sufficient space is secured in a motor case cover made of synthetic resin so that three electric elements such as chip capacitors can be

incorporated together with their wiring and support arrangement.

The small-size motor in accordance with the present invention includes a metallic case 1 having a bottomed hollow cylindrical shape, fitted with a magnet 2 on the inner peripheral surface thereof; a case cover 11 made of synthetic resin, mounted so as to close an opening of the case 1; and a rotor fitted with a laminated core 22, windings 23 wound on the laminated core 22, and a commutator 24 on a shaft 21.

10 The case cover 11 supports a pair of brush units each of which has a brush arm 12 fitted with a brush 4 and a brush base 13 fixed and connected to the brush arm 12. The case cover 11 is formed with three voids to contain three electric elements such as chip capacitors. A first electric element is fixed
15 mechanically between the paired brush units in a first void to be connected electrically. The remaining two second and third electric elements are located on both sides of the first electric element and are pressed on the brush base in the motor shaft direction by a body earth terminal 14 in second
20 and third voids, so that the body earth terminal 14 is fixed to the case cover 11, whereby the two electric elements are fixed mechanically and connected electrically.

Also, the first electric element is fixed mechanically and connected electrically between both fixing portions 8
25 via a metallic spring (U-shaped spring 18), each of which connects the brush arm 12 of each of the paired brush units with the brush base 13. One electrode of each of the second

and third electric elements is mounted on the side face of a brush base end portion 9, and the other electrode thereof is pressed by the body earth terminal 14.

Further, the body earth terminal 14, which is formed by being stamped out of a metal plate and being bent, includes an element pressing portion 16 for pressing the electric element, a body earth portion 17, and a holding portion 20, and is installed so as to cover a case cover fitting portion 7 fitted to the case 1 in such a manner that the case cover fitting portion 7 is held by the body earth portion 17 from the outside and by the holding portion 20 from the inside.

Thus, three electric elements such as chip capacitors can be incorporated together with their wiring and support arrangement.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view showing the whole of a small-size motor in accordance with the present invention, in which an upper half portion of the motor is shown in cross section;

Figure 2 is a view of one of a pair of symmetrical brush units, taken out of the motor;

Figure 3 is a perspective view of a case cover of the small-size motor shown in Figure 1, in which the case cover is viewed from the inside of the motor;

Figure 4 is a partial perspective view for illustrating the installation of a body earth terminal to a case cover;

Figure 5 is a detailed view showing only a body earth terminal taken out of the motor;

Figure 6 is a view of a case cover of a small-size motor having a conventional construction, in which the case cover is viewed from the inside of the motor;

Figure 7 is a partially sectional view of the case cover shown in Figure 6, in which the case cover is cut at a capacitor portion;

Figure 8 is a view for illustrating the need for installing three electric elements;

Figure 9 is a view of another case cover of a small-size motor, in which the case cover is viewed from the inside of the motor, showing a second example of wiring and support arrangement for electric elements different from that shown in Figure 3;

Figure 10 is a sectional view taken along a line A-A in Figure 9;

Figure 11 is a perspective view of the case cover shown in Figure 9, in which the case cover is viewed from the inside; and

Figure 12 is a perspective view of the body earth terminal 14' taken out of the motor shown in the second example.

BEST MODE FOR CARRYING OUT THE INVENTION

Figure 1 is a side view showing the whole of a small-size motor in accordance with the present invention, in which an upper half portion of the motor is shown in cross section.

The small-size motor in accordance with the present invention is not especially different from the small-size motor having a conventional construction except for the arrangement of a case cover to which brushes, input terminals, electric elements, or the like are installed. As shown in Figure 1, magnets 2 are installed on the inner peripheral surface of a case 1 formed of a metallic material into a bottomed hollow cylindrical shape. An opening of the case 1 is closed by a case cover 11 made of synthetic resin that is fitted on the opening of the case 1. In the central portion of the case cover 11 is contained a bearing 3 for a shaft 21.

The other end of the shaft 21 is supported by a bearing 3 provided in the center of the bottom of the case 1 of a bottomed hollow cylindrical shape. The shaft 21 is usually provided with a laminated core 22, windings 23 wound on the laminated core 22, and a commutator 24, which constitute a rotor of the small-size motor. Each of a pair of carbon brushes being in contact with the commutator 24 is installed to a brush unit fixed to the case cover 11.

Figure 3 is a perspective view of a case cover of the small-size motor shown in Figure 1, in which the case cover is viewed from the inside of the motor, showing a first example of wiring and support arrangement for electric elements. Now, a pair of brush units shown in Figure 3 will be described. Figure 2 is a view of one of the paired symmetrical brush units, taken out of the motor. Figure 3 shows a state in which carbon brushes 4 are removed.

As shown in Figure 2, the brush unit is made up of the carbon brush 4 being in slidable contact with the commutator 24, a brush arm 12 for press fitting and holding the carbon brush 4, and a brush base 13 connected with the brush arm 12 by caulking. The caulking is performed by inserting protrusions provided on the connection face of the brush base 13 into holes formed correspondingly in the brush arm 12 as shown in Figure 2 and then by crushing the tip ends of the protrusions by applying a pressure. The brush base 13 is provided with a receptacle terminal 5 formed by cutting and raising a central part of the brush base 13. Therefore, when the receptacle terminal 5 is cut and raised from the brush base 13, a hole corresponding to the cut is formed in the central portion of the brush base 13.

The brush unit constructed as described above is pressed in and held by an attachment portion formed integrally with the synthetic resin made case cover 11 as shown in Figure 3. At this time, the brush unit is fixed at two locations of a fixing portion 8 in which the brush arm 12 is fixed to the brush base 13, and a brush base end portion 9 integral with a base portion of the receptacle terminal 5. The receptacle terminals 5 are brought into electrical contact with a pair of outside terminals 6 inserted from the outside through outside terminal insertion holes 10.

A first chip capacitor 15 (corresponding to C3 shown in Figure 8(B)) is located in a void defined by a side wall and a projecting portion formed of synthetic resin integrally

with the case cover 11, and is fixed between the paired brush units by using a U-shaped spring 18. Thereby, sufficient and reliable fixation of capacitor can be accomplished. However, by further pressing the capacitor with a plate made of synthetic resin, the fixation of capacitor can be made more reliable, and the capacitor can be prevented from coming off.

Specifically, a pair of protrusions 29 formed integrally with the case cover 11 are provided, and the synthetic resin made plate (not shown) in which holes corresponding to the paired protrusions 29 are formed is prepared. After the brush units, the chip capacitor, or the like are assembled, the synthetic resin made plate is mounted by inserting the paired protrusions 29 into the holes, and thereafter the end portions of the protrusions 29 are crushed by applying a pressure, so that the synthetic resin made plate can be fixed.

As shown in Figure 3, one electrode 27 of the chip capacitor is brought into direct contact with the fixing portion 8 of one brush unit, in which the brush arm 12 is fixed to the brush base 13, and the other electrode 28 thereof is brought into contact with the fixing portion 8 of the other brush unit via the metallic U-shaped spring, in which the brush arm 12 is fixed to the brush base 13. Thus, the chip capacitor can not only be fixed securely, but also be connected electrically across both input terminals.

Second and third chip capacitors 19 corresponding to C1 and C2 shown in Figure 8(B) are installed symmetrically at both sides of the case cover 11, and are also connected

electrically. The electrodes of the paired, right and left, chip capacitors 19 are arranged in the motor shaft direction as shown in Figure 3. After one electrode of the chip capacitor 19 is mounted on the side face of the brush base end portion 9, the body earth terminal 14 itself is fixed to the case cover so that the other electrode can be pressed by a metallic body earth terminal 14. When the case cover 11 is fitted and fixed on the opening of the metallic case 1, the body earth terminal 14 is held between the case cover 11 and the case 1 to make the fixation secure and to provide electrically a body ground to the metallic case 1. Thus, one electrode of each of the paired chip capacitors 19 is electrically connected to the brush unit and therefore to the input terminal, and the other electrode thereof is body grounded commonly.

Figure 4 is a partial perspective view for illustrating the installation of a body earth terminal to a case cover, and Figure 5 is a detailed view showing only a body earth terminal taken out of the motor. The body earth terminal 14, which is formed by being stamped out of a metal plate and being bent, is made up of a pair of element pressing portions 16 of a chevron shape for pressing the chip capacitor, a body earth portion 17, and a holding portion 20. By making the element pressing portion 16 in a chevron shape, a tolerance of chip capacitor size can be absorbed. The body earth terminal 14 is installed so as to cover a case cover fitting portion 7 fitted to the case 1 in such a manner that the case cover fitting portion 7 is held by the body earth portion

17 from the outside and by the holding portion 20 from the inside. At this time, the chip capacitor 19 is pressed by the element pressing portion 16 and the side face of the brush base end portion 9 in a void defined by a projecting portion
5 formed integrally with the synthetic resin made case cover 11. Figures 4 and 5 show, as an example, the body earth terminal 14 in which the paired element pressing portions 16 are provided on both sides of the holding portion 20 for one body earth terminal 14. By arranging the element pressing portions 16
10 symmetrically in this manner, the body earth terminal can be used commonly as either of the paired body earth terminals used for one case cover.

Figures 9 to 12 show a second example of wiring and support arrangement for electric elements different from that shown
15 in Figure 3. Figure 9 is a view of a case cover of a small-size motor, in which the case cover is viewed from the inside of the motor, Figure 10 is a sectional view taken along the line A-A in Figure 9, Figure 11 is a perspective view of the case cover shown in Figure 9, in which the case cover is viewed
20 from the inside, and Figure 12 is a perspective view of a body earth terminal 14' taken out of the motor shown in the second example.

The first chip capacitor 15 may be installed in the same way as that in the first example explained with reference
25 to Figure 3. Therefore, the detailed explanation thereof is omitted.

The same paired brush units as those explained with reference to Figure 2 may be used. In the second example, however, there is used a brush unit in which the brush base 13 connected with the brush arm 12 for press fitting and holding the carbon brush is curved into an arc shape, not being straight as shown in Figure 2. The reason for this is that when a disk-shaped varistor for extinguish a spark produced on the brush contact with the commutator is installed on the winding side of the commutator of the rotor, the brush base 13 is prevented from coming into contact with the disk-shaped varistor. Other constructions of the brush unit are as explained with reference to Figure 2.

The second and third chip capacitors 19 corresponding to C1 and C2 shown in Figure 8(B) are installed symmetrically at both sides of the case cover 11. The chip capacitor 19 shown in Figure 3 is mounted on the side face of the brush base end portion 9 and is pressed by the metallic body earth terminal 14 from the motor shaft side. Contrarily, in the second example, as shown in Figure 9 or 11, both electrodes of the chip capacitor 19 are held and fixed in the vertical direction (up and down) in the figure and are connected electrically.

As best seen from Figure 10, which is a sectional view taken along the line A-A in Figure 9, the chip capacitor 19 is held and fixed between the brush base end portion 9 and an element pressing portion 16' of the body earth terminal 14'. The body earth terminal 14' has a construction as shown

in Figure 12. The element pressing portion 16' at one end of the body earth terminal 14' presses the chip capacitor 19, and a body earth portion 17' and a holding portion 20' are set on the case cover so as to hold the case cover

5 therebetween. Thereafter, when the case cover 11 is fitted and fixed on the opening of the metallic case 1, the body earth terminal 14' is held between the case cover 11 and the case 1 to make the fixation secure. At this time, electrically, the body earth terminal 14' provides a body ground to the
10 metallic case 1. Thus, one electrode of each of the paired chip capacitors 19 is electrically connected to the brush unit and therefore to the input terminal, and the other electrode thereof is body grounded commonly.

The body earth terminal 14' shown in Figure 12 is formed
15 by being stamped out of a metal plate (for example, phosphor bronze) and being bent. Such a simple construction makes fabrication easy. Protrusions and raised portion provided at a plurality of locations of the body earth terminal 14' are pressed into concaves formed in the synthetic resin made
20 case cover to fix the body earth terminal 14' to the case cover.

INDUSTRIAL APPLICABILITY

As described above, according to the present invention,
25 three voids are formed in a case cover to contain electric elements such as chip capacitors. A first electric element is fixed between a pair of brush units and is connected

electrically. On the other hand, the remaining two electric elements are located on both sides of the first electric element and are pressed on a brush base in the motor shaft direction by a body earth terminal, so that the body earth terminal is fixed to the case cover. Thereby, the two electric elements are fixed mechanically and connected electrically.

Thereupon, a sufficient space is secured in the motor case cover made of synthetic resin, so that three electric elements such as chip capacitors can be incorporated together with their wiring and support arrangement without the need for soldering.

Further, an electrical noise reducing element need not be provided on the outside of a motor, and electrical noise can be reduced over a wide band.

CLAIMS

1. A small-size motor including a metallic case of a bottomed hollow cylindrical shape fitted with magnets on the inner peripheral surface thereof, a case cover made of synthetic resin mounted so as to close an opening of said case, and a rotor fitted with a laminated core, windings wound on said laminated core, and a commutator on a shaft,

wherein said case cover supports a pair of brush units each of which includes a brush arm fitted with a brush and a brush base fixed and connected to said brush arm, and

wherein said case cover is formed with three voids to contain three electric elements, a first electric element is fixed mechanically between said paired brush units in a first void and is connected electrically, and the remaining two second and third electric elements are located on both sides of said first electric element and are pressed on said brush base in the motor shaft direction by a body earth terminal in second and third voids, so that said body earth terminal is fixed to said case cover and said two electric elements are fixed mechanically and connected electrically.

2. The small-size motor according to claim 1, wherein said first electric element is fixed mechanically between fixing portions of said brush arm and said brush base of each of said paired brush units via a metallic spring and is connected electrically.

3. The small-size motor according to claim 1, wherein one electrode of each of said second and third electric elements

is mounted on the side face of a brush base end portion, and the other electrode thereof is pressed by said body earth terminal.

4. The small-size motor according to claim 1, wherein each of said second and third electric elements is fixed by being held between said brush base end portion and an element pressing portion of said body earth terminal.

5. The small-size motor according to claim 1, wherein said body earth terminal which is formed by being stamped out of a metal plate and being bent, includes an element pressing portion for pressing said electric element, a body earth portion, and a holding portion, and is installed so as to cover a case cover fitting portion fitted to said case in such a manner that said case cover fitting portion is held by said body earth portion from the outside and by said holding portion from the inside.

6. The small-size motor according to claim 1, wherein all of said first to third electric elements are chip capacitors.

ABSTRACT

A small-size motor has a case cover 11 formed with three voids, and electric elements such as chip capacitors are contained in the three voids. A first electric element is mechanically fixed between a pair of brush units in a first void and is electrically connected. The remaining two second and third electric elements are located on both sides of the first electric element and are pressed on a brush base in a motor shaft direction by a body earth terminal 14 in second and third voids, so that the body earth terminal 14 is fixed to the case cover 11 and the two electric elements are mechanically fixed and electrically connected. A sufficient space is secured in the motor case cover made of synthetic resin, so that three electric elements such as chip capacitors can be incorporated together with their wiring and support arrangement.

Fig. 1

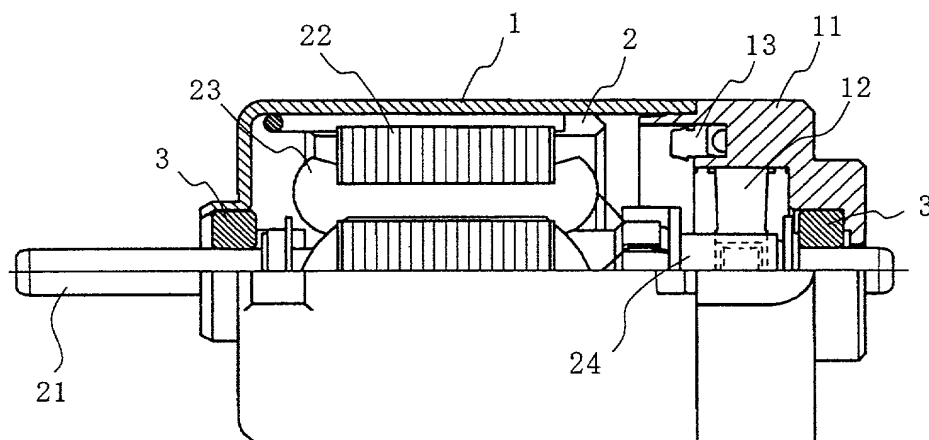


Fig. 2

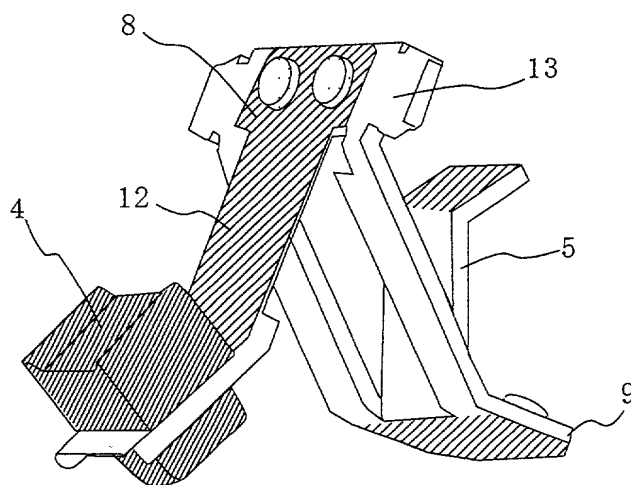
Brush Unit

Fig. 3

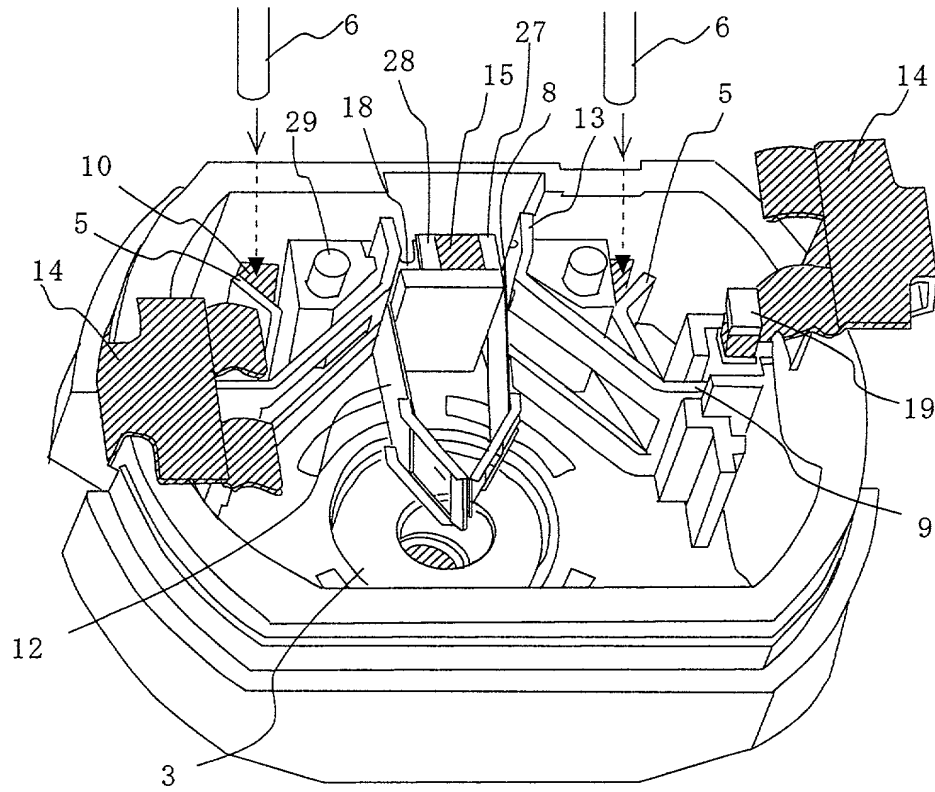


Fig. 4

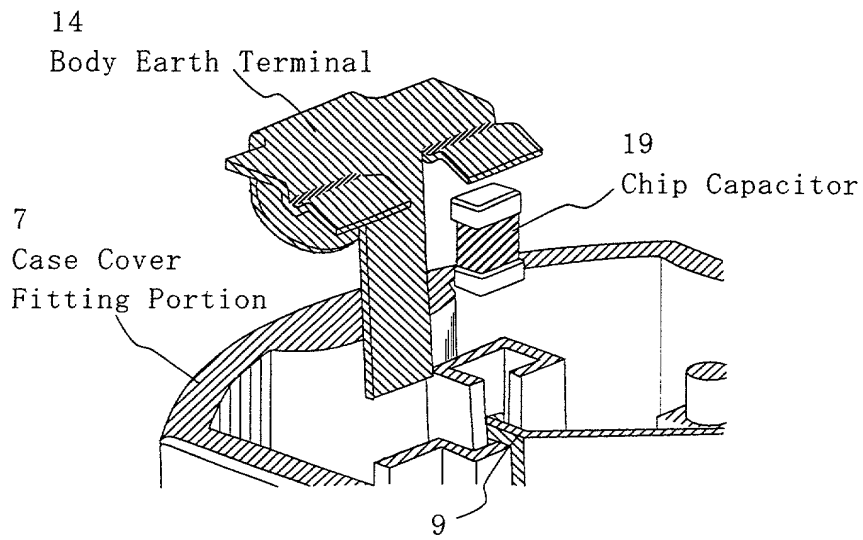


Fig. 5

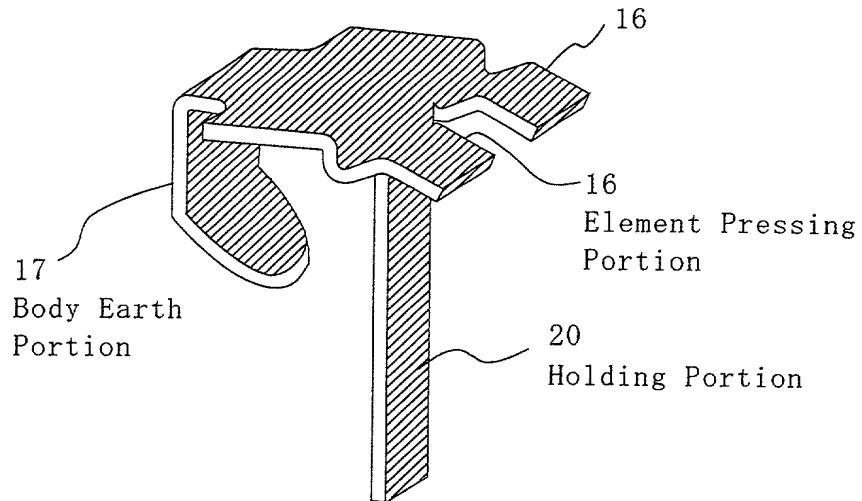
Body Earth Terminal

Fig. 6

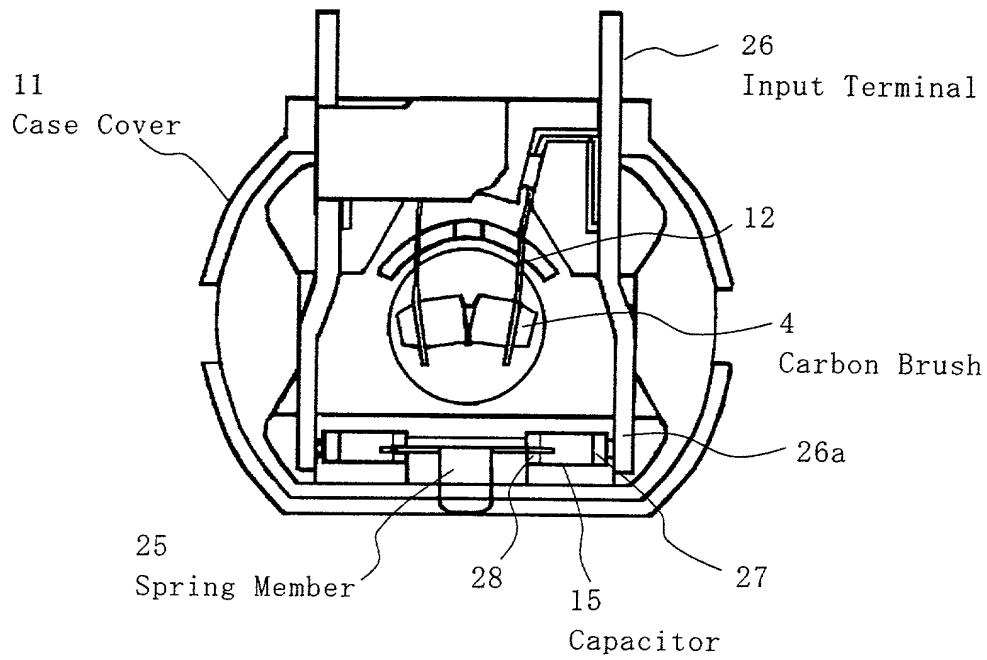
Prior Art

Fig. 7

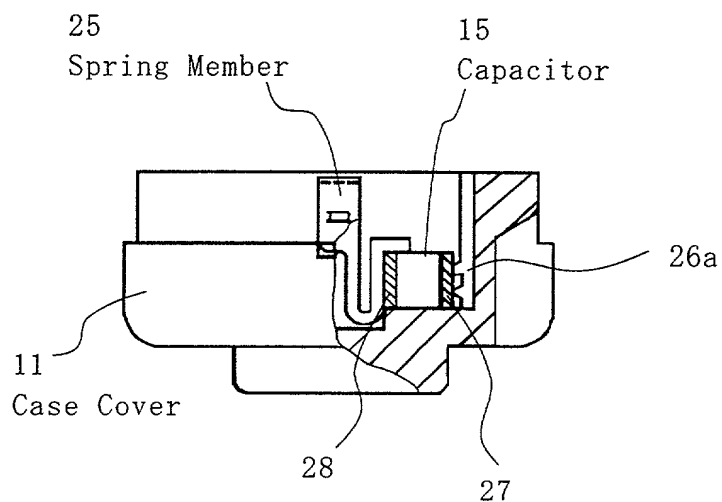
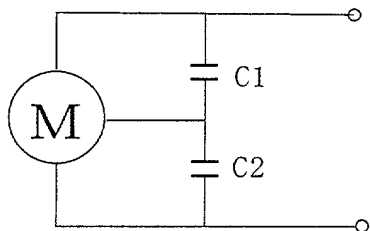
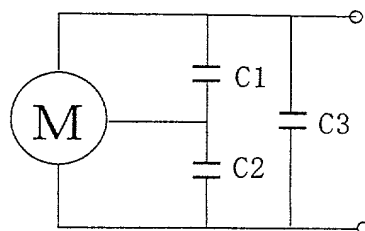
Prior Art

Fig. 8



(A)



(B)

Fig. 9

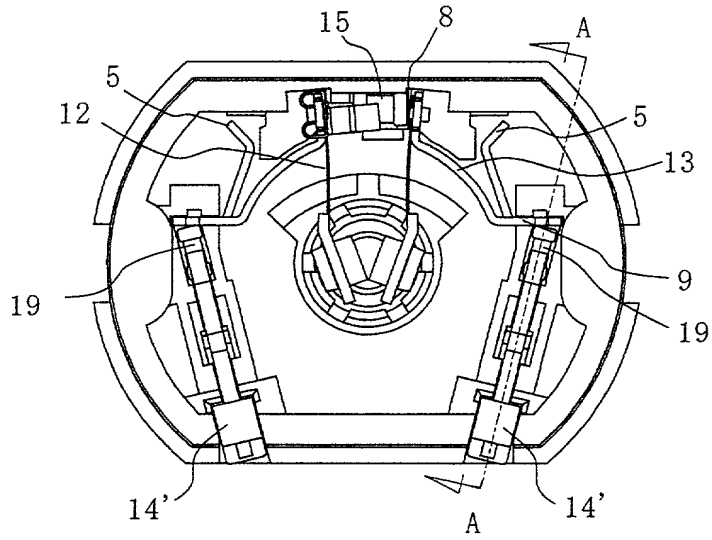


Fig. 10

A - A Sectional View

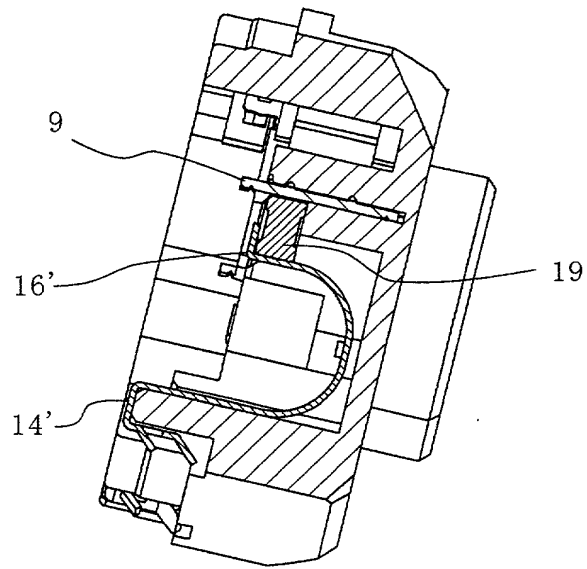


Fig. 11

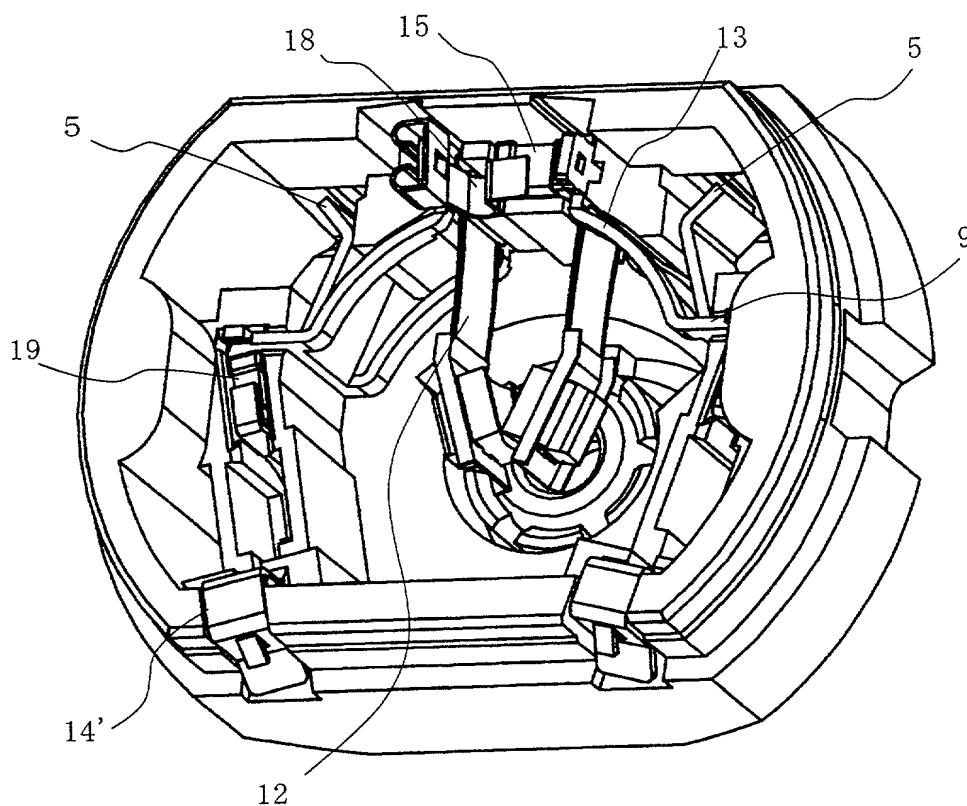
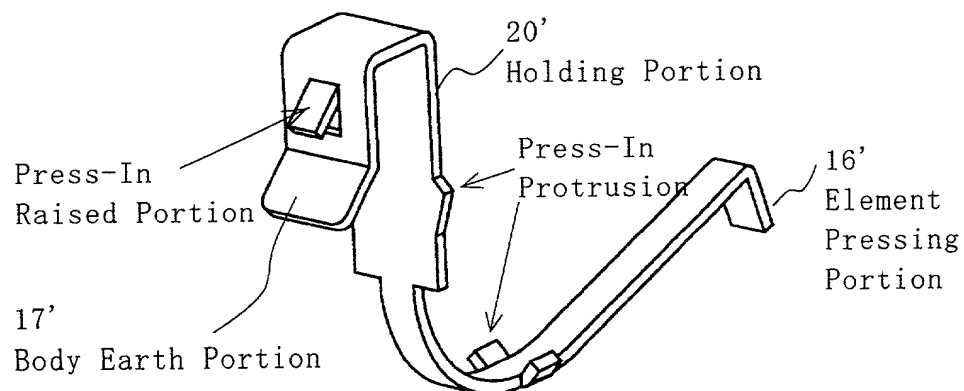


Fig. 12

Body Earth Terminal



DECLARATION FOR PATENT APPLICATION

Docket No. 70182

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: SMALL-SIZE MOTOR

the specification of which

(Check one) ☐ is attached hereto.

☒ was filed as PCT international application

Number PCT/IP00/07439

on 24/October/2000

and was amended under PCT Article 19

on _

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 (a)-(d) or 365 (b) of any foreign application(s) for patent or inventor's certificate or 365 (a) of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date or any PCT international application(s) designating at least one country other than the United States of America by me on the same subject matter having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

11/333968

(Number)

Japan

(Country)

25/November/19

99

(Day/Month/Year filed)

Priority Claimed

Yes

(Number)

(Country)

(Day/Month/Year filed)

(Number)

(Country)

(Day/Month/Year filed)

I hereby claim the benefit under Title 35, United States Code, 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code 112. I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No)

(Filing Date)

(Patented, Pending, Abandoned)

(Application Serial No)

(Filing Date)

(Patented, Pending, Abandoned)

5 I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: John J. McGlew, Reg. 17,722; and/or John James McGlew, Reg. 31,903; and/or Hilda S. McGlew Reg. 30,295; and/or Theobald Dengler, Reg. 34,575; and/or Keith D. Moore, Reg. 44,951.

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Address all correspondence to:

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SCARBOROUGH STATION

SCARBOROUGH, NEW YORK 10510-0827

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

